ALBERTA TIER I CRITERIA FOR CONTAMINATED SOIL ASSESSMENT AND REMEDIATION

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Alberta Tier I Criteria for Contaminated Soil Assessment and Remediatio

The Province of Alberta requires that a contaminated soil be remediated by the polluter or owner. The criteria outlined in this document are used to determine the need for remediation, and quantify acceptable concentrations of soil contaminants.

In accordance with the National Guidelines for Decommissioning Industrial Sites (CCME 1991), Alberta Environmental Protection subscribes to a two-tier approach to setting acceptable concentrations of contaminants in soil. Tier I values are generic and approximate acceptable concentrations of soil contaminants for all site conditions and land uses without defining actual risk. In contrast, Tier II criteria are site-specific concerning protection of human health and the environment. Such criteria are based on acceptable risk specific to the site in consideration of such variables as soil, geology, surface and groundwater, climate and land use.

Tier I criteria are presented in this document. Tier II criteria offer an alternative, and are developed by the proponent. Proponents opting for Tier II remediation criteria must provide credible risk-based scientific documentation in support of their criteria, and be willing to defend them before the public and Alberta Environmental Protection.

Tier I criteria have been developed from the scientific literature, and from existing guidelines and current practices in Alberta and other political jurisdictions in Canada and abroad. This guide is not intended to be exhaustive in its listing of contaminants and will be revised as information and practices evolve.

Alberta Tier I Criteria for Contaminated Soil Assessment and Remediatio

General

pH (0.01 M $CaCl_2$)[1]	6 to 8.5
electrical conductivity (dS m^{-1})[2]	2
sodium adsorption ratio[2]	6

Inorganics[3], mg kg^{-1} (ppm)

arsenic	10
barium	600
beryllium	5
bromide, water soluble	20
boron, hot water soluble	2
cadmium	1
chromium, 6+	5
chromium, total	100
cobalt	20
copper	80
cyanide, water-soluble	0.5
cyanide, total	5
fluoride, total	200
lead4	50
mercury	0.2
molybdenum	4
nickel	40
selenium	2
sulphur, elemental5	500
thallium	1
vanadium	100
zinc	120

Organics, mg kg^{-1} (ppm)

Aliphatics

Halogenated Aliphatics, individual or total*	0.1

1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
1,2-dichloroethene (trans- and cis- forms)
dichloromethane
dichloropropane (1,2-,1,3- and 2,2- forms)
dichloropropene (1,3-, trans 1,2- and cis 1,2- forms)
1,1,2,2-tetrachloroethane
tetrachloroethene (perchloroethylene)
trichloroethene
tetrachloromethane (carbon tetrachloride)
trichloroethane (1,1,1- and 1,1,2- isomers)
trichloromethane (chloroform)
vinyl chloride
dibromochloropropane

*total concentrations are the sum of individual constituent concentrations

Aromatics

Monocyclic aromatic hydrocarbons (MAH)

benzene*	0.05
ethylbenzene*	0.5
toluene4	1.0
xylene (1,2-, 1,3- and 1,4- forms)4	1.0
styrene	0.1
Chlorobenzenes (all congeners), individual or total*	0.05
Phthalic acid esters, individual or total	30

bis (2-ethylhexyl) phthalate
dibutylphthalate
dimethylphthalate

*total concentrations are the sum of individual constituent concentrations

Organics (cont'd), mg kg^{-1} (ppm)

Aromatics (cont'd)

Polycyclic aromatic hydrocarbons (PAH)	
Chlorinated PAH, individual or total	0.1
Non-chlorinated PAH, individual	0.1
Non-chlorinated PAH, total	1.0
benzo[a]anthracene (1,2-benzanthracene)	
7,12-dimethlybenzanthracene	
chrysene	
benzo[b]fluoranthene	
benzo[j]fluoranthene	
benzo[k]fluoranthene	
benzo[g,h,i]perylene	
benzo[c]phenanthrene	
pyrene	
benzo[a]pyrene	
dibenzo[a,h]pyrene	
dibenzo[a,i]pyrene	
dibenzo[a,j]pyrene	
indeno[1,2,3-cd]pyrene	
acenaphthene	
acenapthylene	
anthracene	
fluoranthene	
naphthalene	
phenanthrene	
Polychlorinated Biphenyls (PCB)	0.5
Heterocyclic hydrocarbons	
dioxins	
2,3,7,8-tetrachloro-p-dioxin equivalents	0.001[a]
furans	0.01
thiophenes, including dibenzothiophene	0.1
quinoline	0.1

Organics (cont'd), mg kg^{-1} (ppm)

Aromatics (cont'd)

Phenolics

Chlorinated phenolics, individual or total*	0.05
2-chlorophenol	
3-chlorophenol	
4-chlorophenol	
2,4-dichlorophenol	
2,4,6-tricholorophenol	
tetrachlorophenol, all isomers	
pentachlorophenol	
4-chloro-3-methylphenol	
Non-chlorinated phenols, individual or total*	
(unless shown otherwise)	0.1
2,4-dimethyphenol	
2,4-dinitrophenol	
2-methyl-4,6-dinitrophenol	
2-nitrophenol	
4-nitrophenol	
phenol*	0.05
cresol	

Other

Pesticides and metabolites, total*	0.1
aldrin	
dieldrin	
chlordane	
DDT and metabolites	
4,4-DDT	
4,4-DDE (p p'-DDX)	
4,4-DDD (p p'-TDE)	
endosulfan and metabolites	
a-endosulfan-Alpha	
b-endosulfan-Beta	
endosulfan sulfate	

*total concentrations are the sum of individual constituent concentrations

Organics (cont'd), mg kg^{-1} (ppm)

Other (cont'd)

endrin and metabolites endrin endrin aldehyde	0.01
heptachlor and metabolites heptachlor heptachlor epoxide	0.01
hexachlorocyclohexane (all isomers) a-BHC-Alpha b-BHC-Beta r-BHC (lindane) Gamma g-BHC-Delta	0.01
mineral oil and grease	1,000'

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